

WHAT IS CLAIMED IS:

1. ~~A liquid crystal display panel comprising~~

a pair of substrate structures having plural pixels where an image is produced,

liquid crystal filling a gap between the substrate structures of said pair and selectively making said pixels dark and bright for producing said image, and

column spacers formed on one of said substrate structures of said pair and held in contact with the other of said substrate structures, the ratio of the total contact area between said column spacers and said other of said substrate structures to the total area occupied by said plural pixels being fallen within the range from 0.050 percent to 0.150 percent.

2. The liquid crystal display panel as set forth in claim 1, in which said column spacers are respectively associated with said pixels.

3. The liquid crystal display panel as set forth in claim 1, further comprising a reservoir formed between said substrate structures for preventing said pair of substrate structures from increase of said gap by accumulating part of said liquid crystal.

4. The liquid crystal display panel as set forth in claim 3, further comprising additional column spacers formed outside said plural pixels.

5. The liquid crystal display panel as set forth in claim 4, further comprising a sealing layer formed between said plural pixels and a peripheral area where said additional column spacers are formed.

6. The liquid crystal display panel as set forth in claim 2, in which said column spacers are formed in one of said substrate structures, and switching transistors, pixels electrodes respectively connected to said switching transistors and a common electrode are incorporated in the other of said substrate structures.

7. The liquid crystal display panel as set forth in claim 6, further comprising a sealing layer formed around said plural pixels and reinforced with spacers.

8. ~~The liquid crystal display panel as set forth in claim 7, in which said spacers are spherical and have a diameter expressed as~~

$$DM = (A + B + 2C + D + E + F + G) - H - B - E - G = A + D + 2C - H$$

where DM is the diameter of said spacers in micron, A is a thickness of color filters formed on said one of said substrate structures in micron, B is a thickness of an overcoat layer covering said color filters in micron, C is a thickness of orientation layers respectively covering said overcoat layer and a passivation layer over said switching transistors and said pixel electrodes in micron, D is a height of said column spacers in micron, E is a thickness of said passivation layer in micron, F is a thickness of a gate insulating layer forming parts of said switching transistors in micron, G is a thickness of gate electrodes forming other parts of said switching transistors in micron and H is a ~~thickness of a black matrix covered with said color filters in micron.~~

9. The liquid crystal display panel as set forth in claim 8, in which an actual diameter of said spacers is equal to or less than the sum of said diameter DM and 2 microns.

10. The liquid crystal display panel as set forth in claim 1, in which each of said column spacers is associated with pixels selected from said plural pixels.

11. The liquid crystal display panel as set forth in claim 10, in which said column spacers are classified into two groups one of which is taller than the other of said two groups.

12. The liquid crystal display panel as set forth in claim 10, further comprising a reservoir formed between said substrate structures for preventing said pair of substrate structures from increase of said gap by accumulating part of said liquid crystal.

13. The liquid crystal display panel as set forth in claim 12, further comprising a sealing layer formed between said plural pixels and a peripheral area where additional column spacers are formed.

14. The liquid crystal display panel as set forth in claim 1, in which said liquid crystal exerts a pressure lower than the atmospheric pressure on the inner surfaces of said substrate structures while any electric power is not applied thereto in room temperature.

15. ~~A process for fabricating a liquid crystal display panel, comprising the steps of:~~

- a) preparing a pair of substrate structures having column spacers;
- b) assembling the substrate structures of said pair in alignment with one another for creating a gap therebetween;
- c) injecting liquid crystal into said gap;

d) evacuating part of said liquid crystal from said gap so as to make a pressure exerted on the inner surfaces of said substrate structures lower than the atmospheric pressure; and

e) confining the remaining part of said liquid crystal in said gap.

16. The process for fabricating a liquid crystal display panel as set forth in claim 15, in which pressure ranging from  $0.01 \text{ N/m}^2$  to  $6 \text{ kN/m}^2$  is applied to said substrate structures in said step b).

17. The process for fabricating a liquid crystal display panel as set forth in claim 15, in which said step b) includes the sub-steps of

b-1) roughly aligning said substrate structures in non-contact state,

b-2) bringing said substrate structures into contact with one another, and

b-3) exactly aligning said substrate structures with one another under application of pressure ranging from  $0.01 \text{ N/m}^2$  to  $6 \text{ kN/m}^2$ .

18. The process as set forth in claim 15, in which force is exerted on said substrate structures for evacuating said part of said liquid crystal in said step d).

19. The process as set forth in claim 15, in which said column spacers formed in one of said substrate structures are held in contact with the other of said substrate structures for creating said gap, and the ratio of total contact area between said column spacers and said other of said substrate structures to the area occupied by pixels is fallen within the range between 0.050% to 0.150%.